

We Claim:

1. A treated textile article, said article comprising:
 - (a) a synthetic fiber substrate; and
 - (b) an effective amount of a polyamide treatment agent including a hydrophobic component; and a hydrophilic component.
2. The treated textile article according to Claim 1, wherein said hydrophobic component is between about 19 and 95 mole percent of said polyamide treatment agent.
3. The treated textile article according to Claim 2, wherein said treated textile article has a Normalized Average Moisture Transport Durability (inch/inch) value of between about 0.1 and 1 when wicking is measured according to the T-PACC vertical strip wicking test where the water transported along the strip is measured at 1 minute intervals for 5 minutes with the value at 5 minutes being reported in inches.
4. The treated textile article according to Claim 2, wherein said treated textile article has a ratio of (an Average Moisture Transport With Treatment and After Five Launderings)/(an Average Moisture Transport With Treatment and No Launderings) of between about 30 and 120 percent when wicking is measured according to the T-PACC vertical strip wicking test where the water transported along the strip is measured at 1 minute intervals for 5 minutes with the value at 5 minutes being reported in inches..
5. The treated textile article according to Claim 2, wherein said treated textile article has a ratio of (Average Moisture Transport With Treatment and No Launderings)/(Average Moisture Transport With No Treatment and No Launderings) of between about 100 and 400 percent when wicking is measured according to the T-PACC vertical strip wicking test where the water transported along the strip is measured at 1 minute intervals for 5 minutes with the value at 5 minutes being reported in inches.

6. The treated textile article according to Claim 2 wherein said hydrophobic component is between about 30 and 80 mole percent of said polyamide treatment agent.

7. The treated textile article according to Claim 6, wherein said treated textile article has a Normalized Average Moisture Transport Durability (inch/inch) value of between about 0.4 and 1 when wicking is measured according to the T-PACC vertical strip wicking test where the water transported along the strip is measured at 1 minute intervals for 5 minutes with the value at 5 minutes being reported in inches.

8. The treated textile article according to Claim 6, wherein said treated textile article has a ratio of (an Average Moisture Transport With Treatment and After Five Launderings)/(an Average Moisture Transport With Treatment and No Launderings) of between about 50 and 120 percent when wicking is measured according to the T-PACC vertical strip wicking test where the water transported along the strip is measured at 1 minute intervals for 5 minutes with the value at 5 minutes being reported in inches.

9. The treated textile article according to Claim 6, wherein said treated textile article has a ratio of (Average Moisture Transport With Treatment and No Launderings)/(Average Moisture Transport With No Treatment and No Launderings) of between about 220 and 400 percent when wicking is measured according to the T-PACC vertical strip wicking test where the water transported along the strip is measured at 1 minute intervals for 5 minutes with the value at 5 minutes being reported in inches.

10. The treated textile article according to Claim 2 wherein said hydrophobic component is between about 30 and 75 mole percent of said polyamide treatment agent.

11. The treated textile article according to Claim 10, wherein said treated textile article has a Normalized Average Moisture Transport Durability (inch/inch) value of between about .55 and 1 when wicking is measured according to the T-PACC vertical strip wicking test where the water transported along the strip is measured at 1 minute intervals for 5 minutes with the value at 5 minutes being reported in inches.

12. The treated textile article according to Claim 10, wherein said treated textile article has a ratio of (an Average Moisture Transport With Treatment and After Five Launderings)/(an Average Moisture Transport With Treatment and No Launderings) of between about 60 and 120 percent when wicking is measured according to the T-PACC vertical strip wicking test where the water transported along the strip is measured at 1 minute intervals for 5 minutes with the value at 5 minutes being reported in inches.

13. The treated textile article according to Claim 10, wherein said treated textile article has a ratio of (Average Moisture Transport With Treatment and No Launderings)/ (Average Moisture Transport With No Treatment and No Launderings) of between about 250 and 400 percent when wicking is measured according to the T-PACC vertical strip wicking test where the water transported along the strip is measured at 1 minute intervals for 5 minutes with the value at 5 minutes being reported in inches.

14. The treated textile article according to Claim 2 wherein said synthetic fiber substrate is selected from the group consisting of a polyamide, an aramid, a polyester, an acrylic, a vinyl, a polyurethane and a polyalkylene.

15. The treated textile article according to Claim 14 further including a natural fiber to form a blend.

16. The treated textile article according to Claim 15 wherein said natural fiber is selected from the group consisting of a rayon, cotton, acetate, wool, and silk.

17. A polyamide treatment agent for use with a textile article formed from a synthetic fiber substrate for providing improved moisture transport while at the same time imparting durability of the moisture transport, said polyamide treatment agent including:

- a hydrophobic component;
- a hydrophilic component; and
- an effective amount of any of an oxyalkylene derivative, an ether linkage, and an oxyalkylene derivative and an ether linkage.

18. The polyamide treatment agent according to claim 17 wherein said effective amount of any of an oxyalkylene derivative, an ether linkage, and an oxyalkylene derivative and an ether linkage includes an effective amount of an hydrophilic oxyalkylene derivative.

19. The treated textile article according to Claim 18, wherein said hydrophilic oxyalkylene derivative is between about 40 and 80 weight percent of said polyamide treatment agent.

20. The treated textile article according to Claim 19, wherein said treated textile article has a Normalized Average Moisture Transport Durability (inch/inch) value of between about 0.1 and 1 when wicking is measured according to the T-PACC vertical strip wicking test where the water transported along the strip is measured at 1 minute intervals for 5 minutes with the value at 5 minutes being reported in inches.

21. The treated textile article according to Claim 19, wherein said treated textile article has a ratio of (an Average Moisture Transport With Treatment and After Five Launderings)/(an Average Moisture Transport With Treatment and No Launderings) of between about 30 and 120 percent when wicking is measured according to the T-PACC vertical strip wicking test where the water transported along the strip is measured at 1 minute intervals for 5 minutes with the value at 5 minutes being reported in inches.

22. The treated textile article according to Claim 19, wherein said treated textile article has a ratio of (Average Moisture Transport With Treatment and No Launderings)/ (Average Moisture Transport With No Treatment and No Launderings) of between about 100 and 400 percent when wicking is measured according to the T-PACC vertical strip wicking test where the water transported along the strip is measured at 1 minute intervals for 5 minutes with the value at 5 minutes being reported in inches.

23. The treated textile article according to Claim 18, wherein said hydrophilic oxyalkylene derivative is between about 46 and 80 weight percent of said polyamide treatment agent where the water transported along the strip is measured at 1 minute intervals for 5 minutes with the value at 5 minutes being reported in inches.

24. The treated textile article according to Claim 23, wherein said treated textile article has a Normalized Average Moisture Transport Durability (inch/inch) value of between about 0.3 and 1 when wicking is measured according to the T-PACC vertical strip wicking test where the water transported along the strip is measured at 1 minute intervals for 5 minutes with the value at 5 minutes being reported in inches.

25. The treated textile article according to Claim 23, wherein said treated textile article has a ratio of (an Average Moisture Transport With Treatment and After Five Launderings)/(an Average Moisture Transport With Treatment and No Launderings) of between about 30 and 100 percent when wicking is measured according to the T-PACC vertical strip wicking test where the water transported along the strip is measured at 1 minute intervals for 5 minutes with the value at 5 minutes being reported in inches.

26. The treated textile article according to Claim 23, wherein said treated textile article has a ratio of (Average Moisture Transport With Treatment and No Launderings)/ (Average Moisture Transport With No Treatment and No Launderings) of between about 200 and 400 percent when wicking is measured according to the T-PACC

vertical strip wicking test where the water transported along the strip is measured at 1 minute intervals for 5 minutes with the value at 5 minutes being reported in inches.

27. The treated textile article according to Claim 18, wherein said hydrophilic oxyalkylene derivative is between about 56 and 78 weight percent of said polyamide treatment agent when wicking is measured according to the T-PACC vertical strip wicking test where the water transported along the strip is measured at 1 minute intervals for 5 minutes with the value at 5 minutes being reported in inches.

28. The treated textile article according to Claim 27, wherein said treated textile article has a Normalized Average Moisture Transport Durability (inch/inch) value of between about 0.6 and 1 when wicking is measured according to the T-PACC vertical strip wicking test where the water transported along the strip is measured at 1 minute intervals for 5 minutes with the value at 5 minutes being reported in inches.

29. The treated textile article according to Claim 27, wherein said treated textile article has a ratio of (an Average Moisture Transport With Treatment and After Five Launderings)/(an Average Moisture Transport With Treatment and No Launderings) of between about 30 and 80 percent when wicking is measured according to the T-PACC vertical strip wicking test where the water transported along the strip is measured at 1 minute intervals for 5 minutes with the value at 5 minutes being reported in inches.

30. The treated textile article according to Claim 27, wherein said treated textile article has a ratio of (Average Moisture Transport With Treatment and No Launderings)/ (Average Moisture Transport With No Treatment and No Launderings) of between about 250 and 400 percent when wicking is measured according to the T-PACC vertical strip wicking test where the water transported along the strip is measured at 1 minute intervals for 5 minutes with the value at 5 minutes being reported in inches.

31. The polyamide treatment agent according to claim 17 wherein said effective amount of any of an oxyalkylene derivative, an ether linkage, and an

oxyalkylene derivative and an ether linkage is an effective amount of an oxyethylene derivative when wicking is measured according to the T-PACC vertical strip wicking test where the water transported along the strip is measured at 1 minute intervals for 5 minutes with the value at 5 minutes being reported in inches.

5

32. The treated textile article according to Claim 31, wherein said oxyethylene derivative is between about 40 and 80 weight percent of said polyamide treatment agent.

33. The treated textile article according to Claim 32, wherein said treated
10 textile article has a Normalized Average Moisture Transport Durability (inch/inch) value of between about 0.1 and 1 when wicking is measured according to the T-PACC vertical strip wicking test where the water transported along the strip is measured at 1 minute intervals for 5 minutes with the value at 5 minutes being reported in inches.

34. The treated textile article according to Claim 32, wherein said treated
15 textile article has a ratio of (an Average Moisture Transport With Treatment and After Five Launderings)/(an Average Moisture Transport With Treatment and No Launderings) of between about 30 and 120 percent when wicking is measured according to the T-PACC vertical strip wicking test where the water transported along the strip is
20 measured at 1 minute intervals for 5 minutes with the value at 5 minutes being reported in inches.

35. The treated textile article according to Claim 32, wherein said treated
25 textile article has a ratio of (Average Moisture Transport With Treatment and No Launderings)/ (Average Moisture Transport With No Treatment and No Launderings) of between about 100 and 400 percent when wicking is measured according to the T-PACC vertical strip wicking test where the water transported along the strip is measured at 1 minute intervals for 5 minutes with the value at 5 minutes being reported in inches.

36. The treated textile article according to Claim 31, wherein said oxyethylene derivative is between about 46 and 80 weight percent of said polyamide treatment agent.

37. The treated textile article according to Claim 36, wherein said treated textile article has a Normalized Average Moisture Transport Durability (inch/inch) value of between about 0.3 and 1 when wicking is measured according to the T-PACC vertical strip wicking test where the water transported along the strip is measured at 1 minute intervals for 5 minutes with the value at 5 minutes being reported in inches.

38. The treated textile article according to Claim 36, wherein said treated textile article has a ratio of (an Average Moisture Transport With Treatment and After Five Launderings)/(an Average Moisture Transport With Treatment and No Launderings) of between about 30 and 100 percent when wicking is measured according to the T-PACC vertical strip wicking test where the water transported along the strip is measured at 1 minute intervals for 5 minutes with the value at 5 minutes being reported in inches.

39. The treated textile article according to Claim 36, wherein said treated textile article has a ratio of (Average Moisture Transport With Treatment and No Launderings)/ (Average Moisture Transport With No Treatment and No Launderings) of between about 200 and 400 percent when wicking is measured according to the T-PACC vertical strip wicking test where the water transported along the strip is measured at 1 minute intervals for 5 minutes with the value at 5 minutes being reported in inches.

40. The treated textile article according to Claim 31, wherein said oxyethylene derivative is between about 56 and 78 weight percent of said polyamide treatment agent.

41. The treated textile article according to Claim 40, wherein said treated textile article has a Normalized Average Moisture Transport Durability (inch/inch) value of between about .6 and 1 when wicking is measured according to the T-PACC vertical strip wicking test where the water transported along the strip is measured at 1 minute intervals for 5 minutes with the value at 5 minutes being reported in inches.

42. The treated textile article according to Claim 40, wherein said treated textile article has a ratio of (an Average Moisture Transport With Treatment and After Five Launderings)/(an Average Moisture Transport With Treatment and No Launderings) of between about 30 and 80 percent when wicking is measured according to the T-PACC vertical strip wicking test where the water transported along the strip is measured at 1 minute intervals for 5 minutes with the value at 5 minutes being reported in inches.

43. The treated textile article according to Claim 40, wherein said treated textile article has a ratio of (Average Moisture Transport With Treatment and No Launderings)/ (Average Moisture Transport With No Treatment and No Launderings) of between about 250 and 400 percent when wicking is measured according to the T-PACC vertical strip wicking test where the water transported along the strip is measured at 1 minute intervals for 5 minutes with the value at 5 minutes being reported in inches.

44. The polyamide treatment agent according to Claim 17, wherein said hydrophilic component is a reaction product of a diacid and a diamine including an effective amount of any of an oxyalkylene derivative, an ether linkage, and an oxyalkylene derivative and an ether linkage.

45. The polyamide treatment agent according to Claim 44 wherein said effective amount of any of an oxyalkylene derivative, an ether linkage, and an oxyalkylene derivative and an ether linkage includes an effective amount of an hydrophilic oxyalkylene derivative.

46. The polyamide treatment agent according to Claim 44, wherein said effective amount of any of an oxyalkylene derivative, an ether linkage, and an oxyalkylene derivative and an ether linkage is an effective amount of an oxyethylene derivative.

47. The polyamide treatment agent according to Claim 17, wherein the hydrophobic component is a reaction product of a diacid and a diamine.

48. The polyamide treatment agent according to Claim 17, wherein the polyamide treatment agent is a reaction product further including heating a mixture of any of said hydrophilic component and said hydrophobic component; a precursor of said hydrophilic component and said hydrophobic component; said hydrophilic component and a precursor of said hydrophobic component; and a precursor of said hydrophilic component and a precursor of said hydrophobic component.

49. The polyamide treatment agent according to Claim 17, wherein the polyamide treatment agent is a reaction product of a reaction product of diacid and diamine and a reaction product of a diacid and a diamine including an effective amount of any of an oxyalkylene derivative, ether linkage, and oxyalkylene derivative and ether linkage.

50. The polyamide treatment agent according to Claim 49 wherein said effective amount of any of an oxyalkylene derivative, an ether linkage, and an oxyalkylene derivative and an ether linkage includes an effective amount of an hydrophilic oxyalkylene derivative.

51. The polyamide treatment agent according to Claim 49 wherein said effective amount of any of an oxyalkylene derivative, an ether linkage, and an oxyalkylene derivative and an ether linkage is an effective amount of an oxyethylene derivative.

52. The polyamide treatment agent according to Claim 17 wherein said hydrophobic component includes a unit based on at least one of the following:

Structure I



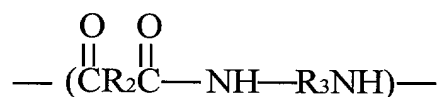
wherein

41180

R₁ is an alkylene group with 3 to 11 carbon atoms that are any one of unsubstituted and substituted;

and

5 Structure II



wherein:

10 R₂ is any one of an alkylene group, a cycloalkylene group and a difunctional aromatic group with the alkylene group and the cycloalkylene of R₂ being 4 to 10 carbon atoms that are any one of unsubstituted and substituted; and

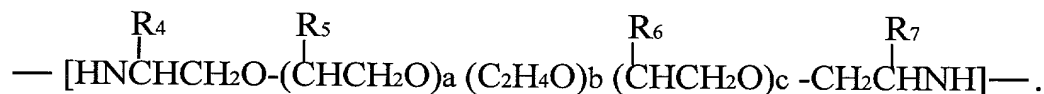
R₃ is any one of an alkylene group, cycloalkylene group and difunctional aromatic group with the alkylene group and the cycloalkylene of R₃ being 2 to 10 carbon atoms that are any one of unsubstituted and substituted.

15 53. The polyamide treatment agent according to Claim 52 wherein said hydrophobic component includes units based on structure I and units based on structure II.

20 54. The polyamide treatment agent according to Claim 53 wherein said polyamide treatment agent is on a molar percent basis between about 19 and 95 based on at least one of structure I, structure II, and structure I and structure II.

25 55. The polyamide treatment agent according to Claim 17 wherein said hydrophilic component includes a unit based on the following:

Structure III



Wherein:

R₄ may be any one of hydrogen and an alkyl of one to four carbon atoms;

R₅ may be any one of hydrogen and an alkyl of one to four carbon atoms;

R₆ may be any one of hydrogen and an alkyl of one to four carbon atoms;

5 R₇ may be any one of hydrogen and an alkyl of one to four carbon atoms;

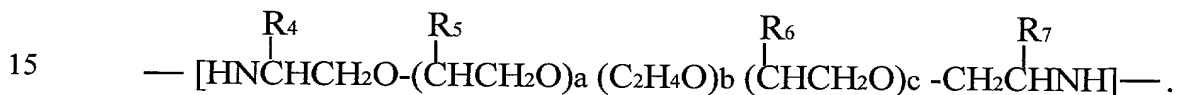
a is from 0 to 3;

b is from 1 to 78; and

c is from 0 to 3.

10 56. The polyamide treatment agent according to claim 52 wherein said hydrophilic component includes a unit based on the following:

Structure III



Wherein:

R₄ may be any one of hydrogen and an alkyl of one to four carbon atoms;

R₅ may be any one of hydrogen and an alkyl of one to four carbon atoms;

20 R₆ may be any one of hydrogen and an alkyl of one to four carbon atoms;

R₇ may be any one of hydrogen and an alkyl of one to four carbon atoms;

a is from 0 to 3;

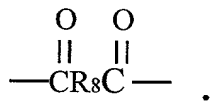
b is from 1 to 78;

c is from 0 to 3; and

25 said unit based on structure III is adjacent to any one of a unit based on diacid; a unit based on structure I, a unit based on structure II and another unit based on structure III.

30 57. The polyamide treatment agent according to Claim 56 wherein said diacid that is unit based on the following:

Structure IV



5 wherein

R_8 is any one of an alkylene group, cycloalkylene group, and a difunctional aromatic group with the alkylene group and the cycloalkylene of R_8 being 4 to 10 carbon atoms that are any one of unsubstituted and substitute.

10 58. The polyamide treatment agent according to Claim 54 further including the reaction product of a platicizer.

15 59. The polyamide treatment agent according to Claim 58 wherein said reaction product of a platicizer is derived from any one of a polyether glycol diamine having a molecular weight less than about 500 and a number of consecutive oxyethylene derivative units are less than about 4; a polyether glycol diamine having a molecular weight greater than about 500 and any one of a ratio of (oxyethylene derivative)/(oxypropylene derivative) less than about 4/6, a ratio of (oxyethylene derivative)/(oxybutylene derivative) less than about 4/6, and a sum of a ratio of (oxyethylene derivative)/(oxypropylene derivative) and a ratio of (oxyethylene derivative)/(oxybutylene derivative) less than about 4/6.

20 60. The polyamide treatment agent according to Claim 56 further including the reaction product of a platicizer.

25

30 61. The polyamide treatment agent according to Claim 60 wherein said reaction product of a platicizer is derived from any one of a polyether glycol diamine having a molecular weight less than about 500 and a number of consecutive oxyethylene derivative units are less than about 4; a polyether glycol diamines having a molecular weight greater than about 500 and any one of a ratio of (oxyethylene

derivative)/(oxypropylene derivative) less than about 4/6, a ratio of (oxyethylene derivative)/(oxybutylene derivative) less than about 4/6, and a sum of a ratio of (oxyethylene derivative)/(oxypropylene derivative) and a ratio of (oxyethylene derivative)/(oxybutylene derivative) less than about 4/6.

5

62. The polyamide treatment agent according to Claim 17 further including a chain terminating group so as to effect at least one of controlling the molecular weight of said polyamide treatment agent, changing the solubility of said polyamide treatment agent in water, and increasing a substantivity of a textile article treated with said polyamide treatment agent.

10

63. The polyamide treatment agent according to Claim 62 wherein said chain terminating group is $(R_9)_d-F$, wherein R_9 is any one of a C_1-C_{24} alkyl, C_1-C_{24} aryl, C_1-C_{24} alkylaryl, C_1-C_{24} alkenyl, and an oxyalkylene derivative; d is 1-2; and F is any one of NH_2 , NH , CHO , $COCl$, and $COOR_{13}$, wherein R_{13} is any of a C_1-C_2 alkyl and hydrogen

15

64. The polyamide treatment agent according to Claim 63 wherein said oxyalkylene derivative is $R_{10}(O-CHR_{11}-CHR_{12})_p-$, wherein R_{10} is any of a C_1-C_4 alkyl; R_{11} is any of a C_1-C_4 alkyl and hydrogen; R_{12} is any of a C_1-C_4 alkyl and hydrogen; p is any value from 1 through 100.

20

65. The polyamide treatment agent according to Claim 17 further including a branching facilitator so as to induce branching of said polyamide treatment agent.

25

66. The polyamide treatment agent according to Claim 65 wherein said branching facilitator is any one of a polyamine and a polyacid.

67. The polyamide treatment agent according to Claim 66 wherein said polyamine is any one of diethylene triamine, triethylene tetraamine, tetraethylene pentamine, poly(oxy(methyl-1,2-ethanediyl), alpha-omega-(2-aminomethylethoxy-, and ether with 2-ethyl-2-(hydroxymethyl)-1,3 propanediol (3:1).

30

68. The polyamide treatment agent according to Claim 66 wherein said polyacid is any one of trimellitic anhydride and citric.

69. The polyamide treatment agent according to Claim 65 wherein said branching facilitator is between about 1% and 3% by weight of said polyamide treatment agent.

70. A treated textile article, said article comprising:

- (a) a synthetic fiber substrate; and
- (b) a polyamide treatment agent including between about 19 and 95 mole percent of a hydrophobic component, an effective amount of any of an oxyalkylene derivative, an ether linkage, and an oxyalkylene derivative and an ether linkage; and a hydrophilic component.

71. The treated textile article according to Claim 70, wherein said treated textile article has a Normalized Average Moisture Transport Durability (inch/inch) value of between about 0.1 and 1 when wicking is measured according to the T-PACC vertical strip wicking test.

72. The treated textile article according to Claim 71, wherein said treated textile article has a ratio of (an Average Moisture Transport With Treatment and After Five Launderings)/(an Average Moisture Transport With Treatment and No Launderings) of between about 30 and 120 percent when wicking is measured according to the T-PACC vertical strip wicking test where the water transported along the strip is measured at 1 minute intervals for 5 minutes with the value at 5 minutes being reported in inches.

73. The treated textile article according to Claim 71, wherein said treated textile article has a ratio of (Average Moisture Transport With Treatment and No

Laundryings)/ (Average Moisture Transport With No Treatment and No Laundryings) of between about 100 and 400 percent when wicking is measured according to the T-PACC vertical strip wicking test where the water transported along the strip is measured at 1 minute intervals for 5 minutes with the value at 5 minutes being reported in inches.

5

74. The treated textile article according to Claim 70 wherein said hydrophobic component is between about 30 and 80 mole percent of said polyamide treatment agent.

75. The treated textile article according to Claim 74, wherein said treated textile article has a Normalized Average Moisture Transport Durability (inch/inch) value of between about 0.4 and 1 when wicking is measured according to the T-PACC vertical strip wicking test where the water transported along the strip is measured at 1 minute intervals for 5 minutes with the value at 5 minutes being reported in inches.

76. The treated textile article according to Claim 74, wherein said treated textile article has a ratio of (an Average Moisture Transport With Treatment and After Five Laundryings)/(an Average Moisture Transport With Treatment and No Laundryings) of between about 50 and 120 percent when wicking is measured according to the T-PACC vertical strip wicking test where the water transported along the strip is measured at 1 minute intervals for 5 minutes with the value at 5 minutes being reported in inches.

77. The treated textile article according to Claim 74, wherein said treated textile article has a ratio of (Average Moisture Transport With Treatment and No Laundryings)/ (Average Moisture Transport With No Treatment and No Laundryings) of between about 220 and 400 percent when wicking is measured according to the T-PACC vertical strip wicking test where the water transported along the strip is measured at 1 minute intervals for 5 minutes with the value at 5 minutes being reported in inches.

78. The treated textile article according to Claim 70 wherein said hydrophobic component is between about 30 and 75 mole percent of said polyamide treatment agent.

41180

79. The treated textile article according to Claim 78, wherein said treated textile article has a Normalized Average Moisture Transport Durability (inch/inch) value of between about 0.55 and 1 when wicking is measured according to the T-PACC vertical strip wicking test where the water transported along the strip is measured at 1 minute intervals for 5 minutes with the value at 5 minutes being reported in inches.

80. The treated textile article according to Claim 78, wherein said treated textile article has a ratio of (an Average Moisture Transport With Treatment and After Five Launderings)/(an Average Moisture Transport With Treatment and No Launderings) of between about 60 and 120 percent when wicking is measured according to the T-PACC vertical strip wicking test where the water transported along the strip is measured at 1 minute intervals for 5 minutes with the value at 5 minutes being reported in inches.

81. The treated textile article according to Claim 78, wherein said treated textile article has a ratio of (Average Moisture Transport With Treatment and No Launderings)/(Average Moisture Transport With No Treatment and No Launderings) of between about 250 and 400 percent when wicking is measured according to the T-PACC vertical strip wicking test where the water transported along the strip is measured at 1 minute intervals for 5 minutes with the value at 5 minutes being reported in inches.

82. The treated textile article according to Claim 70 wherein said synthetic fiber substrate is selected from the group consisting of a polyamide, an aramid, a polyester, an acrylic, a vinyl, a polyurethane and a polyalkylene.

83. The treated textile article according to Claim 82 further including a natural fiber to form a blend.

84. The treated textile article according to Claim 83 wherein said natural fiber is selected from the group consisting of a rayon, cotton, acetate, wool, and silk.

85. The polyamide treatment agent according to claim 70 wherein said effective amount of any of an oxyalkylene derivative, an ether linkage, and an oxyalkylene derivative and an ether linkage includes an effective amount of an hydrophilic oxyalkylene derivative.

86. The treated textile article according to Claim 85, wherein said hydrophilic oxyalkylene derivative is between about 40 and 80 weight percent of said polyamide treatment agent.

87. The treated textile article according to Claim 86, wherein said treated textile article has a Normalized Average Moisture Transport Durability (inch/inch) value of between about 0.1 and 1 when wicking is measured according to the T-PACC vertical strip wicking test where the water transported along the strip is measured at 1 minute intervals for 5 minutes with the value at 5 minutes being reported in inches.

88. The treated textile article according to Claim 86, wherein said treated textile article has a ratio of (an Average Moisture Transport With Treatment and After Five Launderings)/(an Average Moisture Transport With Treatment and No Launderings) of between about 30 and 120 percent when wicking is measured according to the T-PACC vertical strip wicking test where the water transported along the strip is measured at 1 minute intervals for 5 minutes with the value at 5 minutes being reported in inches.

89. The treated textile article according to Claim 86, wherein said treated textile article has a ratio of (Average Moisture Transport With Treatment and No Launderings)/ (Average Moisture Transport With No Treatment and No Launderings) of between about 100 and 400 percent when wicking is measured according to the T-PACC vertical strip wicking test where the water transported along the strip is measured at 1 minute intervals for 5 minutes with the value at 5 minutes being reported in inches.

90. The treated textile article according to Claim 85, wherein said hydrophilic oxyalkylene derivative is between about 46 and 80 weight percent of said polyamide treatment agent.

91. The treated textile article according to Claim 90, wherein said treated textile article has a Normalized Average Moisture Transport Durability (inch/inch) value of between about 0.3 and 1 when wicking is measured according to the T-PACC vertical strip wicking test where the water transported along the strip is measured at 1 minute intervals for 5 minutes with the value at 5 minutes being reported in inches.

92. The treated textile article according to Claim 90, wherein said treated textile article has a ratio of (an Average Moisture Transport With Treatment and After Five Launderings)/(an Average Moisture Transport With Treatment and No Launderings) of between about 30 and 100 percent when wicking is measured according to the T-PACC vertical strip wicking test where the water transported along the strip is measured at 1 minute intervals for 5 minutes with the value at 5 minutes being reported in inches.

93. The treated textile article according to Claim 90, wherein said treated textile article has a ratio of (Average Moisture Transport With Treatment and No Launderings)/ (Average Moisture Transport With No Treatment and No Launderings) of between about 200 and 400 percent when wicking is measured according to the T-PACC vertical strip wicking test where the water transported along the strip is measured at 1 minute intervals for 5 minutes with the value at 5 minutes being reported in inches.

94. The treated textile article according to Claim 85, wherein said hydrophilic oxyalkylene derivative is between about 56 and 78 weight percent of said polyamide treatment agent.

95. The treated textile article according to Claim 94, wherein said treated textile article has a Normalized Average Moisture Transport Durability (inch/inch) value

of between about .6 and 1 when wicking is measured according to the T-PACC vertical strip wicking test where the water transported along the strip is measured at 1 minute intervals for 5 minutes with the value at 5 minutes being reported in inches.

5 96. The treated textile article according to Claim 94, wherein said treated textile article has a ratio of (an Average Moisture Transport With Treatment and After Five Launderings)/(an Average Moisture Transport With Treatment and No Launderings) of between about 30 and 80 percent when wicking is measured according to the T-PACC vertical strip wicking test where the water transported along the strip is measured at 1
10 minute intervals for 5 minutes with the value at 5 minutes being reported in inches.

 97. The treated textile article according to Claim 94, wherein said treated textile article has a ratio of (Average Moisture Transport With Treatment and No Launderings)/ (Average Moisture Transport With No Treatment and No Launderings) of
15 between about 250 and 400 percent when wicking is measured according to the T-PACC vertical strip wicking test where the water transported along the strip is measured at 1 minute intervals for 5 minutes with the value at 5 minutes being reported in inches.

 98. The polyamide treatment agent according to claim 70 wherein said
20 effective amount of any of an oxyalkylene derivative, an ether linkage, and an oxyalkylene derivative and an ether linkage is an effective amount of an oxyethylene derivative.

 99. The treated textile article according to Claim 98, wherein said oxyethylene
25 derivative is between about 40 and 80 weight percent of said polyamide treatment agent.

 100. The treated textile article according to Claim 99, wherein said treated textile article has a Normalized Average Moisture Transport Durability (inch/inch) value of between about 0.1 and 1 when wicking is measured according to the T-PACC vertical
30 strip wicking test where the water transported along the strip is measured at 1 minute intervals for 5 minutes with the value at 5 minutes being reported in inches.

101. The treated textile article according to Claim 99, wherein said treated textile article has a ratio of (an Average Moisture Transport With Treatment and After Five Launderings)/(an Average Moisture Transport With Treatment and No Launderings) of between about 30 and 120 percent when wicking is measured according to the T-PACC vertical strip wicking test where the water transported along the strip is measured at 1 minute intervals for 5 minutes with the value at 5 minutes being reported in inches.

102. The treated textile article according to Claim 99, wherein said treated textile article has a ratio of (Average Moisture Transport With Treatment and No Launderings)/ (Average Moisture Transport With No Treatment and No Launderings) of between about 100 and 400 percent when wicking is measured according to the T-PACC vertical strip wicking test where the water transported along the strip is measured at 1 minute intervals for 5 minutes with the value at 5 minutes being reported in inches.

103. The treated textile article according to Claim 98, wherein said oxyethylene derivative is between about 46 and 80 weight percent of said polyamide treatment agent.

104. The treated textile article according to Claim 103, wherein said treated textile article has a Normalized Average Moisture Transport Durability (inch/inch) value of between about 0.3 and 1 when wicking is measured according to the T-PACC vertical strip wicking test where the water transported along the strip is measured at 1 minute intervals for 5 minutes with the value at 5 minutes being reported in inches.

105. The treated textile article according to Claim 103, wherein said treated textile article has a ratio of (an Average Moisture Transport With Treatment and After Five Launderings)/(an Average Moisture Transport With Treatment and No Launderings) of between about 30 and 100 percent when wicking is measured according to the T-PACC vertical strip wicking test where the water transported along the strip is

measured at 1 minute intervals for 5 minutes with the value at 5 minutes being reported in inches.

106. The treated textile article according to Claim 103, wherein said treated
5 textile article has a ratio of (Average Moisture Transport With Treatment and No
Launderings)/ (Average Moisture Transport With No Treatment and No Launderings) of
between about 200 and 400 percent when wicking is measured according to the T-PACC
vertical strip wicking test where the water transported along the strip is measured at 1
minute intervals for 5 minutes with the value at 5 minutes being reported in inches.

107. The treated textile article according to Claim 98, wherein said oxyethylene
derivative is between about 56 and 78 weight percent of said polyamide treatment agent.

108. The treated textile article according to Claim 107, wherein said treated
15 textile article has a Normalized Average Moisture Transport Durability (inch/inch) value
of between about .6 and 1 when wicking is measured according to the T-PACC vertical
strip wicking test where the water transported along the strip is measured at 1 minute
intervals for 5 minutes with the value at 5 minutes being reported in inches.

109. The treated textile article according to Claim 107, wherein said treated
20 textile article has a ratio of (an Average Moisture Transport With Treatment and After
Five Launderings)/(an Average Moisture Transport With Treatment and No Launderings)
of between about 30 and 80 percent when wicking is measured according to the T-PACC
vertical strip wicking test where the water transported along the strip is measured at 1
25 minute intervals for 5 minutes with the value at 5 minutes being reported in inches.

110. The treated textile article according to Claim 107, wherein said treated
textile article has a ratio of (Average Moisture Transport With Treatment and No
Launderings)/ (Average Moisture Transport With No Treatment and No Launderings) of
30 between about 250 and 400 percent when wicking is measured according to the T-PACC

vertical strip wicking test where the water transported along the strip is measured at 1 minute intervals for 5 minutes with the value at 5 minutes being reported in inches.

111. The polyamide treatment agent according to Claim 70, wherein said hydrophilic component is a reaction product of a diacid and a diamine including an effective amount of any of an oxyalkylene derivative, an ether linkage, and an oxyalkylene derivative and an ether linkage.

112. The polyamide treatment agent according to Claim 111, wherein said effective amount of any of an oxyalkylene derivative, an ether linkage, and an oxyalkylene derivative and an ether linkage includes an effective amount of an hydrophilic oxyalkylene derivative.

113. The polyamide treatment agent according to Claim 111, wherein said effective amount of any of an oxyalkylene derivative, an ether linkage, and an oxyalkylene derivative and an ether linkage is an effective amount of an oxyethylene derivative.

114. The polyamide treatment agent according to Claim 70, wherein the hydrophobic component is a reaction product of a diacid and a diamine.

115. The polyamide treatment agent according to Claim 70, wherein the polyamide treatment agent is a reaction product further including heating a mixture of any of said hydrophilic component and said hydrophobic component; a precursor of said hydrophilic component and said hydrophobic component; said hydrophilic component and a precursor of said hydrophobic component; and a precursor of said hydrophilic component and a precursor of said hydrophobic component.

116. The polyamide treatment agent according to Claim 70, wherein the polyamide treatment agent is a reaction product of a reaction product of diacid and

diamine and a reaction product of a diacid and a diamine including an effective amount of any of an oxyalkylene derivative, ether linkage, and oxyalkylene derivative and ether linkage.

117. The polyamide treatment agent according to Claim 116, wherein said effective amount of any of an oxyalkylene derivative, an ether linkage, and an oxyalkylene derivative and an ether linkage includes an effective amount of an hydrophilic oxyalkylene derivative.

118. The polyamide treatment agent according to Claim 116 wherein said effective amount of any of an oxyalkylene derivative, an ether linkage, and an oxyalkylene derivative and an ether linkage is an effective amount of an oxyethylene derivative.

119. The polyamide treatment agent according to Claim 70 wherein said hydrophobic component includes a unit based on at least one of the following:

Structure I

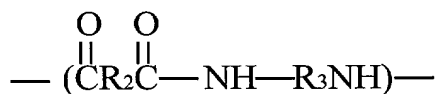


wherein

R₁ is an alkylene group with 3 to 11 carbon atoms that are any one of unsubstituted and substituted;

and

Structure II



wherein:

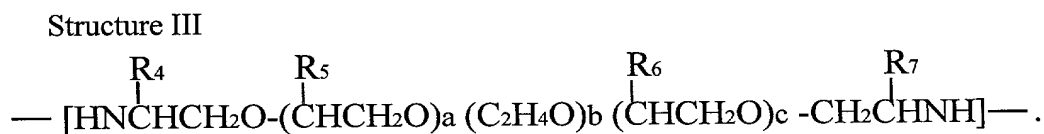
R₂ is any one of an alkylene group, a cycloalkylene group and a difunctional aromatic group with the alkylene group and the cycloalkylene of R₂ being 4 to 10 carbon atoms that are any one of unsubstituted and substituted; and

R₃ is any one of an alkylene group, cycloalkylene group and difunctional aromatic group with the alkylene group and the cycloalkylene of R₃ being 2 to 10 carbon atoms that are any one of unsubstituted and substituted.

120. The polyamide treatment agent according to Claim 119 wherein said hydrophobic component includes units based on structure I and units based on structure II.

121. The polyamide treatment agent according to Claim 120 wherein said polyamide treatment agent is on a molar percent basis between about 19 and 95 based on at least one of structure I, structure II, and structure I and structure II.

122. The polyamide treatment agent according to Claim 70 wherein said hydrophilic component includes a unit based on the following:



Wherein:

R₄ may be any one of hydrogen and an alkyl of one to four carbon atoms;

R₅ may be any one of hydrogen and an alkyl of one to four carbon atoms;

R₆ may be any one of hydrogen and an alkyl of one to four carbon atoms;

R₇ may be any one of hydrogen and an alkyl of one to four carbon atoms;

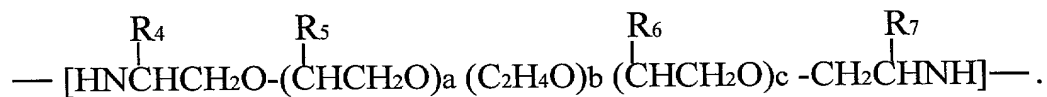
a is from 0 to 3;

b is from 1 to 78; and

c is from 0 to 3.

123. The polyamide treatment agent according to claim 119 wherein said hydrophilic component includes a unit based on the following:

Structure III



Wherein:

R₄ may be any one of hydrogen and an alkyl of one to four carbon atoms;

R₅ may be any one of hydrogen and an alkyl of one to four carbon atoms;

R₆ may be any one of hydrogen and an alkyl of one to four carbon atoms;

R₇ may be any one of hydrogen and an alkyl of one to four carbon atoms;

a is from 0 to 3;

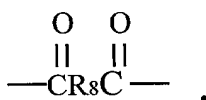
b is from 1 to 78;

c is from 0 to 3; and

said unit based on structure III is adjacent to any one of a unit based on diacid; a unit based on structure I, a unit based on structure II and another unit based on structure III.

124. The polyamide treatment agent according to Claim 123 wherein said diacid includes a unit based on the following:

Structure IV



wherein

R₈ is any one of an alkylene group, cycloalkylene group, and a difunctional aromatic group with the alkylene group and the cycloalkylene of R₈ being 4 to 10 carbon atoms that are any one of unsubstituted and substitute.

125. The polyamide treatment agent according to Claim 121 further including the reaction product of a platicizer.

126. The polyamide treatment agent according to Claim 125 wherein said reaction product of a plasticizer is derived from any one of a polyether glycol diamine having a molecular weight less than about 500 and a number of consecutive oxyethylene derivative units are less than about 4; a polyether glycol diamine having a molecular weight greater than about 500 and any one of a ratio of (oxyethylene derivative)/(oxypropylene derivative) less than about 4/6, a ratio of (oxyethylene derivative)/(oxybutylene derivative) less than about 4/6, and a sum of a ratio of (oxyethylene derivative)/(oxypropylene derivative) and a ratio of (oxyethylene derivative)/(oxybutylene derivative) less than about 4/6.

127. The polyamide treatment agent according to Claim 123 further including the reaction product of a plasticizer.

128. The polyamide treatment agent according to Claim 127 wherein said reaction product of a plasticizer is derived from any one of a polyether glycol diamine having a molecular weight less than about 500 and a number of consecutive oxyethylene derivative units are less than about 4; a polyether glycol diamine having a molecular weight greater than about 500 and any one of a ratio of (oxyethylene derivative)/(oxypropylene derivative) less than about 4/6, a ratio of (oxyethylene derivative)/(oxybutylene derivative) less than about 4/6, and a sum of a ratio of (oxyethylene derivative)/(oxypropylene derivative) and a ratio of (oxyethylene derivative)/(oxybutylene derivative) less than about 4/6.

129. The polyamide treatment agent according to Claim 70 further including a chain terminating group so as to effect at least one of controlling the molecular weight of said polyamide treatment agent, changing the solubility of said polyamide treatment agent in water, and increasing a substantivity of a textile article treated with said polyamide treatment agent.

130. The polyamide treatment agent according to Claim 129 wherein said chain terminating group is $(R_9)_d-F$, wherein R_9 is any one of a C_1-C_{24} alkyl, C_1-C_{24} aryl, C_1-C_{24} alkylaryl, C_1-C_{24} alkenyl, and an oxyalkylene derivative; d is 1-2; and F is any one of NH_2 , NH , CHO , $COCl$, and $COOR_{13}$, wherein R_{13} is any of a C_1-C_2 alkyl and hydrogen.

131. The polyamide treatment agent according to Claim 130 wherein said oxyalkylene derivative is $R_{10}(O-CHR_{11}-CHR_{12})_p-$, wherein R_{10} is any of a C_1-C_4 alkyl; R_{11} is any of a C_1-C_4 alkyl and hydrogen; R_{12} is any of a C_1-C_4 alkyl and hydrogen; p is any value from 1 through 100.

132. The polyamide treatment agent according to Claim 70 further including a branching facilitator so as to induce branching of said polyamide treatment agent.

133. The polyamide treatment agent according to Claim 132 wherein said branching facilitator is any one of a polyamine and a polyacid.

134. The polyamide treatment agent according to Claim 133 wherein said polyamine may be any one of diethylene triamine, triethylene tetraamine, tetraethylene pentamine, poly(oxy(methyl-1,2-ethanediyl), alpha-omega-(2-aminomethylethoxy-, and ether with 2-ethyl-2-(hydroxymethyl)-1,3 propanediol (3:1).

135. The polyamide treatment agent according to Claim 133 wherein said polyacid is any one of trimellitic anhydride and citric.

136. The polyamide treatment agent according to Claim 132 wherein said branching facilitator is between about 1% and 3% by weight of said polyamide treatment agent.

137. A method for making a treated textile article, said method comprising the steps of:

- (a) providing a synthetic fiber substrate and
- (b) applying a polyamide treatment agent to said substrate, said treatment agent including a hydrophilic component and a hydrophobic component.

138. A method for making a polyamide treatment agent for use with a textile article formed from a synthetic fiber substrate to provide improved moisture transport, said method comprising the steps of:

- (a) providing precursors to a hydrophilic component;
- (b) providing precursors to a hydrophobic component; and
- (c) reacting said precursors to a hydrophilic component and said precursors to a hydrophobic component to create said polyamide treatment agent having effective amounts of one of an oxyalkylene derivative, an ether linkage, and an oxyalkylene derivative and an ether linkage.

139. A method for making a treated textile article, said method comprising the steps of:

- (a) providing a synthetic fiber substrate; and
- (b) applying a polyamide treatment agent to said substrate, said treatment agent comprised of between about 19 and 95 mole percent of a hydrophobic component, and effective amounts of one of an oxyalkylene derivative, an ether linkage, and an oxyalkylene derivative and an ether linkage; and a hydrophilic component.

140. A treated textile article having a Normalized Average Moisture Transport Durability (inch/inch) value of between about 0.4 and 1 when wicking is measured according to the T-PACC vertical strip wicking test where the water transported along the strip is measured at 1 minute intervals for 5 minutes with the value at 5 minutes being reported in inches.

141. The treated textile article according to Claim 140, further having a ratio of (an Average Moisture Transport With Treatment and After Five Launderings)/(an Average Moisture Transport With Treatment and No Launderings) of between about 60 and 120 percent when wicking is measured according to the T-PACC vertical strip wicking test where the water transported along the strip is measured at 1 minute intervals for 5 minutes with the value at 5 minutes being reported in inches.

142. The treated textile article according to Claim 141, further having a ratio of (Average Moisture Transport With Treatment and No Launderings)/ (Average Moisture Transport With No Treatment and No Launderings) of between about 220 and 400 percent when wicking is measured according to the T-PACC vertical strip wicking test where the water transported along the strip is measured at 1 minute intervals for 5 minutes with the value at 5 minutes being reported in inches.

143. The treated textile article according to Claim 141, wherein said treated textile article has a Normalized Average Moisture Transport Durability (inch/inch) value of between about 0.6 and 1 when wicking is measured according to the T-PACC vertical strip wicking test where the water transported along the strip is measured at 1 minute intervals for 5 minutes with the value at 5 minutes being reported in inches.

144. A treated textile article having a ratio of (an Average Moisture Transport With Treatment and After Five Launderings)/(an Average Moisture Transport With Treatment and No Launderings) of between about 60 and 120 percent when wicking is measured according to the T-PACC vertical strip wicking test where the water transported

along the strip is measured at 1 minute intervals for 5 minutes with the value at 5 minutes being reported in inches.

145. The treated textile article according to Claim 144, wherein said ratio of (an Average Moisture Transport With Treatment and After Five Launderings)/(an Average Moisture Transport With Treatment and No Launderings) of between about 70 and 120 percent when wicking is measured according to the T-PACC vertical strip wicking test where the water transported along the strip is measured at 1 minute intervals for 5 minutes with the value at 5 minutes being reported in inches.

146. A treated textile article having a ratio of (Average Moisture Transport With Treatment and No Launderings)/ (Average Moisture Transport With No Treatment and No Launderings) of between about 220 and 400 percent when wicking is measured according to the T-PACC vertical strip wicking test where the water transported along the strip is measured at 1 minute intervals for 5 minutes with the value at 5 minutes being reported in inches.

147. The treated textile article according to Claim 146, wherein said ratio of (Average Moisture Transport With Treatment and No Launderings)/ (Average Moisture Transport With No Treatment and No Launderings) of between about 250 and 400 percent when wicking is measured according to the T-PACC vertical strip wicking test where the water transported along the strip is measured at 1 minute intervals for 5 minutes with the value at 5 minutes being reported in inches.

148. The treated textile article according to Claim 146, wherein said ratio of (Average Moisture Transport With Treatment and No Launderings)/ (Average Moisture Transport With No Treatment and No Launderings) of between about 280 and 400 percent when wicking is measured according to the T-PACC vertical strip wicking test where the water transported along the strip is measured at 1 minute intervals for 5 minutes with the value at 5 minutes being reported in inches.

0994910 41604
T09T T64660